AIR COMPLIANCE INSPECTION REPORT

U.S. Environmental Protection Agency
Region VII
Environmental Sciences and Technology Division

Big Ox Energy
1616 D Avenue
Dakota City, Nebraska 68776

Telephone Number: (920) 615-5246

AFS Plant I.D. Number: 31-043-00092

Inspection Date: February 13-15, 2017

INTRODUCTION

At the request of the Air and Waste Management Division (AWMD), the Environmental Sciences and Technology Division/Environmental Field Compliance Branch (ENST/EFCB) conducted an unannounced Partial Compliance Evaluation (PCE) emissions survey of Big Ox Energy, located in Dakota City, Nebraska. The emissions survey focused on the duct work, pressure relief valves, flare, and Biogas Cleanup Skid System.

Air Program: SIP, NSPS, MACT

Facility Classification Code: No Permit Required-Synthetic Minor

PARTICIPANTS

Big Ox Energy (BOE):
Kevin W. Bradley, Director of Business and Economic Development. (Mr. Bradley participated on the conference call on Day 1 and was onsite on Day 3). kbradley@bigoxenergy.com
Perry Winkler, Plant Manager (Onsite).
Mike Nelson, Maintenance Manager (Onsite).
Jose Argueta, Plant Employee (Onsite).
Rob Ernest, Operations Manager (Conference call).
Bill Guerry, Attorney (Conference call).
Jason Oswald, BOE Engineer (Conference call).

Nebraska Department of Environmental Quality (NDEQ):
Nathan Kush, Environmental Program Specialist (Norfolk Field Office).
Kyle Morton, Environmental Program Specialist (Lincoln Office).

U.S. Environmental Protection Agency (EPA):
Sean P. Bergin, Environmental Scientist

Laura Brewer, Environmental Engineer
Dave Hensley, Physical Scientist

INSPECTION PROCEDURES

I arrived onsite with Messrs. Hensley, Kush, and Morton and Ms. Brewer at approximately 3:00 p.m. on February 13, 2017. We were greeted by the guard and escorted to the security building where we reviewed the visitor safety information and facility rules and signed in. We walked from the security building to the facility where we met with Mr. Winkler. Mr. Hensley explained the purpose of the inspection and we presented our credentials. I then explained my portion of the inspection and was escorted with the NDEQ inspectors to the control room by Mr. Argueta. After reviewing some basic facility operations with Mr. Argueta, Mr. Nelson entered the control room and informed us that the inspection was over for now and that we were to come with him to a conference room that is located in the security building, where we met Ms. Brewer and Mr. Hensley. Once in the conference room we had a conference call with Messrs. Oswald, Bradley, Ernest, and Guerry. The following reasons were given for not allowing entry into the facility for the inspection:

- The appropriate facility people were not on site for the inspection;
- Safety issues with training to have personnel on the roof;
- The right people to provide safety training were not available; and,
- Paperwork to be signed needed to be reviewed.

Mr. Hensley contacted Anne Rauch (EPA Counsel) to explain the situation, and I contacted Jeff Field (ENST/EFCB) and Joe Terriquez (AWMD). I then drove offsite to the service road that runs along the south and east borders of the BOE property to take photographs and FLIR Infrared images of the facility. The NDEQ personnel accompanied me and sampled H_2S concentrations. A flare upset, which was photographed and recorded using the FLIR camera, occurred from approximately 4:24 to 4:27 p.m. Later that evening I was informed by Ms. Brewer that she, Mr. Hensley and myself would have a conference call with Ms. Rauch the morning of February 14, 2017, to discuss site entry.

During the conference call the morning of February 14, 2017, we were informed that we would not be able to gain access to the facility until 9:00 a.m. February 15, 2017. I returned to BOE alone and recorded FLIR images of the BOE duct work from the anaerobic digesters to the flare and the Biogas Cleanup Skid System (BCSS) from the service road. A flare upset, which was photographed and recorded using the FLIR camera, occurred from approximately 10:35 to 10:39 a.m.

At 9:00 a.m. on February 15, 2017, I returned to the facility and met with Ms. Brewer and Mr. Hensley, the NDEQ inspectors, and Messrs. Winkler, Bradley, and Nelson. Following a safety review and tour of the flare and BCSS, Mr. Bradley, the NDEQ inspectors, and I, left the group to record FLIR images. I recorded FLIR images of the duct work from the anaerobic digesters to the flare and BCSS, including all connectors and pressure relief valves (PRV), from some areas of the roof and from ground level. When I concluded recording FLIR images, we met with the rest of the participants in an office in the facility. I reported what I had done and gave preliminary details of what I had observed with the FLIR camera, including the observed flare

upsets. I copied all of the FLIR images recorded to a DVD and provided it to Mr. Bradley before leaving the facility.

PROCESS/FACILITY DESCRIPTION

BOE is a newly constructed, biologically-based, natural gas production facility, located in Dakota City, Nebraska. The BOE biogas facility is capable of producing up to 1,314 million standard cubic feet of biogas per year from an anaerobic digestion process. Feedstock for the process consists of process wastewater and organic wastes from the surrounding industries. A construction permit for the facility was issued on April 15, 2016 (Attachment 1).

BOE receives wastes and packaged food wastes by truck. The waste is unloaded into two receiving pits which flow to the Receiving Tank. The Receiving Tank contents are pumped to the Equalization/Mixing Tank. From the Equalization/Mixing Tank, the waste passes through a heat exchanger to Anaerobic Digester #1 and Anaerobic Digester #2. Solids are dewatered using two centrifuges and hauled out by truck. Digester effluent is piped to the city wastewater treatment plant. Digester emissions are captured and ducted to the flare (EP06) and BCSS (EP07).

Currently, the untreated biogas is flared. Once the BCSS is operational, the biogas from Anaerobic Digesters #1 and #2 will be ducted to the BCSS. This system will compress, scrub, and directly inject the treated biogas into the adjacent natural gas transmission line. The BOE permit application indicated that the BCSS will remove sulfur *"The scrubbing process will result in crystalline sulfur solids that will be washed and sold as a sulfur by-product."*. During the inspection I learned that a sulfur removal system will not be installed. BOE representatives stated that the waste stream contains very little sulfur and that sulfur removal is not necessary.

The compression process of the BCSS creates a compressor tail gas that will be vented directly to the atmosphere. If the BCSS is unavailable or treated biogas cannot be injected into the natural gas transmission line, BOE will send the biogas from Anaerobic Digesters #1 and #2 to the flare. In the construction permit application, BOE requested an operational limitation of 500 annual operating hours for the flaring of biogas.

SURVEY OBSERVATIONS AND FINDINGS

Day 1 (February 13, 2017).

Weather Conditions: clear, with a maximum temperature of 54°F and wind speeds of 10 to 22 mph from the west south-west.

During my brief interview with Mr. Argueta, I was told that the pressure of the anaerobic digesters is monitored. The pressure was 2.3 psi at the time of the inspection. The pressure in the duct from the digesters to the flare is 9 psi. The pressure in the digesters only appears to go up when the flare is not functioning properly, which had not happened for approximately one month. Prior to that period, the flare went out regularly.

FLIR images of the flare, BCSS, and PRVs, were recorded from south and southeast of the facility from approximately 4:00 to 4:30 p.m. (offsite). The FLIR images were recorded from Site's A, B, and C (Please refer to Attachment 2, which contains an annotated aerial of the facility showing the locations of equipment and the areas where images were recorded, along with the FLIR log, Photograph Log and Photographs taken at the time of the inspection).

An upset was observed from approximately 4:24 to 4:27 p.m. This is documented by photographs taken from 4:25 to 4:47 p.m. (See Photographs 1 through 13, Attachment 2). The photographs were taken from sites B and C (or in route from B to C). The upset is also documented on FLIR images MOV_1370.mp4 and MOV_1371.mp4 (Attachment 3, CD).

Mr. Morton and Mr. Kush were sampling H_2S concentrations with a Jerome 631-X Analyzer at the time of the upset. The results of their sampling can be found in Attachment 4.

Day 2 (February 14, 2017).

Weather conditions: Clear, with a maximum temperature of 49°F and winds 15 to 25 mph from the north west.

I arrived onsite alone at approximately 9:00 a.m. and told the guard at the gate that I would be offsite on the service road to record FLIR images and photographs of the facility. I recorded FLIR and regular visual images of the flare, BCSS, PRVs, and the duct to the flare and BCSS (in this report the PRVs are arbitrarily labelled PRV1W through PRV4W). A telephoto lens was used for most of the recorded images, many of the images include high sensitivity mode (HSM) images as well. Images were recorded from Site's A, B, C and D.

An upset was observed from Site A at approximately 10:35 to 10:39 a.m. This is recorded on Photograph 17 (Attachment 2) and on FLIR image MOV_1374.mp4 (Attachment 3). Although the upset occurred from 10:35 to 10:39, FLIR image MOV_1373.mp4, recorded at 10:09 a.m., appears to indicate that the flare was not operating properly as early as 10:09 a.m. that day.

Day 3 (February 15, 2017).

Weather conditions: Clear, with a maximum temperature of 49°F and wind 7 to 15 mph from the south south-east.

The participating EPA and NDEQ inspectors were onsite at 9:00 a.m. and met with Messrs. Winkler, Bradley and Nelson. Mr. Bradley and I discussed roof access. Non-intrinsically safe equipment is not allowed on the roof over the digesters. I agreed to FLIR from the safe areas of the roof only. We then toured the flare and BCSS. I recorded FLIR image, at that time, of the duct leading to the flare, the flare, and the BCSS (Location 1). During the tour we asked about the observed plant upsets that occurred on the 13th and 14th. A facility representative explained that on Monday (2/13/2017) technicians had arrived to begin startup of the BCSS. Up to this point the system had not been used and all gas generated was flared. During a test of the system, the valve leading to the first compressor did not open, which caused pressure to back flow into the biogas header and to the flare. This happened again on 2/14/2017. Big Ox plans to attempt a

startup of the system with a lower volume of gas the next time they test the system. Big Ox had not reported the incidents to NDEQ. Big Ox believes they are still in the "Shake-down period", and view the incidents as part of operational startup. After the tour Mr. Bradley took the NDEQ inspectors and myself to do the FLIR imaging work.

I took FLIR images of the PRVs, gas duct, and flare, some from the roof and some from the ground level. FLIR images of the PRVs and duct connectors contain HSM images. All locations of recorded images are logged.

SUMMARY

Big Ox Energy is operating under a construction permit issued by NDEQ on April 15, 2016.

The duct from the anaerobic digesters to the flare and BCSS, including the PRVs and duct connectors, were observed using a FLIR IR camera over a 3-day period, both on and off-site.

Two process upsets were observed. The first on Monday, February 13, 2017, from 4:24 to 4:27 p.m. and the second on Tuesday, February 14, 2017, from 10:35 to 10:39 a.m.

Some of the recorded images of the flare, such as MOV_1373.mp4, appear to indicate that un-combusted hydrocarbons may be exiting the flare. All of the recorded images are currently under review by the AWMD.

Sean P. Bergin
Environmental Scientist
Date: 2/27/2017

Attachments:

1. BOE Construction Permit, 13 pages.
2. Annotated Aerial, Photograph Log, FLIR Log and Photographs, 22 pages.
3. FLIR Images, CD.
4. NDEQ Field Report, 2 pages.

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STATE OF NEBRASKA

Pete Ricketts
Governor

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AIR QUALITY CONSTRUCTION PERMIT

PERMIT NUMBER: CP15-008

Facility Name: Big Ox Energy – Siouxland, LLC **NDEQ Facility ID#:** 105921

Mailing Address:
6601 County Road R
Denmark, Wisconsin 54208

Facility Location:
1616 D Avenue
Dakota City, Dakota County, Nebraska

Project Description: New biologically-based natural gas production facility

Standard Industrial Classification (SIC) Code: 2869, Industrial Organic Chemicals

Revised or Superseded Construction Permits: none

Pursuant to Chapter 14 of the Nebraska Air Quality Regulations, the public has been notified by prominent advertisement of this proposed construction of an air contaminant source and the thirty (30) day period allowed for comments has elapsed. This construction permit approves the proposed project as identified in the air quality construction permit application #15-008 received May 18, 2015, including any supporting information received prior to issuance of this permit. Additional details of the proposed project, including estimated pollutant emissions caused by the project, can be found in the accompanying Fact Sheet.

Compliance with this permit shall not be a defense to any enforcement action for violation of an ambient air quality standard. The permit holder, owner, and operator of the facility shall assure that the installation, operation, and maintenance of all equipment is in compliance with all of the conditions of this permit.

The undersigned issues this permit on behalf of the Director under the authority of Title 129 – Nebraska Air Quality Regulations as amended July 6, 2015.

4/15/16
Date

Shelley Schneider
Shelley Schneider, Air Administrator
Air Quality Division

TABLE OF CONTENTS

ABBREVIATIONS, SYMBOLS, and UNITS OF MEASURE

AP-42	Compilation of Air Pollutant Emission Factors, Volume I, Stationary Point and Area Sources
BACT	Best Available Control Technology
bhp	Brake Horsepower
BMP	Best Management Practice
Btu	British Thermal Unit
bu	Bushel
CAA	Clean Air Act
CE	Control Equipment
CEM	Continuous Emissions Monitor
CEMS	Continuous Emissions Monitoring System
cf	Cubic feet
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	CO_2 equivalent
CP	Construction Permit
DGS	Distiller's Grains with Solubles
DDGS	Dry Distillers Grains with Solubles
dscf	Dry Standard Cubic Feet
dscfm	Dry Standard Cubic Feet per Minute
EMIS	Emergency Management Information System
EPA	Environmental Protection Agency
EQC	Environmental Quality Council
EP	Emission Point
ESP	Electrostatic Precipitator
EU	Emission Unit
FID	Facility Identification Number
FDCP	Fugitive Dust Control Plan
FGR	Flue Gas Recirculation
FIP	Federal Implementation Plan
FR	Federal Register
ft	Feet
FTIR	Fourier Transform Infrared
GHGs	Greenhouse Gases
H_2S	Hydrogen Sulfide
HAP	Hazardous Air Pollutant
hp	Horsepower
hr	Hour
lb	Pound
LDAR	Leak Detection and Repair
LNB	Low-NO_x Burner
MACT	Maximum Achievable Control Technology
Mgal	One Thousand gallons
MMBtu	One Million British Thermal Units
MMscf	One Million Standard Cubic Feet
MSDS	Material Safety Data Sheet
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NDEQ	Nebraska Department of Environmental Quality
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NSPS	New Source Performance Standard
NSR	New Source Review
PAL	Plant-wide Applicability Limit
Pb	Lead (chemical abbreviation)
PbR	Permit-by-Rule
PEMS	Parametric Emissions Monitoring System
PM	Particulate Matter
PM_{10}	Particulate Matter with and aerodynamic diameter equal to or less than 10 microns
$PM_{2.5}$	Particulate Matter with and aerodynamic diameter equal to or less than 2.5 microns
ppb	Parts per Billion
ppm	Parts per Million
ppmv	Parts per Million by volume
ppmvd	Parts per Million by volume, dry basis
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
RVP	Reid Vapor Pressure
RATA	Relative Accuracy Test Audit
RMP	Risk Management Plan
RTO	Regenerative Thermal Oxidizer
scf	Standard Cubic Feet
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxides
TDS	Total Dissolved Solids
TO	Thermal Oxidizer
TO/HRSG	Thermal Oxidizer with Heat Recovery Steam Generator
tpy	Tons per year
TRS	Total Reduced Sulfur
TSP	Total Suspended Particulate Matter
ULNB	Ultra Low-NO_x Burner
UST	Underground Storage Tank
UTM	Universal Transverse Mercator
VHAP	Volatile Hazardous Air Pollutant
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
WDGS	Wet Distiller's Grains with Solubles

I. GENERAL CONDITIONS

(A) This permit is not transferable to another source or location. {Chapter 17}

(B) Holding of this permit does not relieve the owner or operator of the source from the responsibility to comply with all applicable portions of the Nebraska Air Quality Regulations and any other requirements under local, State, or Federal law. Any permit noncompliance shall constitute a violation of the Nebraska Environmental Protection Act and the Federal Clean Air Act, and is grounds for enforcement action or permit revocation. {Chapter 41 and Chapter 17, Section 011}

(C) Application for review of plans or advice furnished by the Director will not relieve the owner or operator of legal compliance with any provision of these regulations, or prevent the Director from enforcing or implementing any provision of these regulations. {Chapter 37}

(D) Any owner or operator who failed to submit any relevant facts or who submitted incorrect information in a permit application shall, upon becoming aware of such failure or incorrect submittal, promptly submit such supplementary facts or corrected information. If the owner or operator wishes to make changes at the source that will result in change(s) to values, specifications, and/or locations of emission points that were indicated in the permit application (or other supplemental information provided by the owner or operator and reviewed by the NDEQ in issuance of this permit), the owner or operator must receive approval from the NDEQ before the change(s) can be made. In addition, any modification which may result in an adverse change to the air quality impacts predicted by atmospheric dispersion modeling (such as changes in stack parameters or increases in emission rates, potential emissions, or actual emissions) shall have prior approval from the NDEQ. The owner or operator shall provide all necessary information to verify that there are no substantive changes affecting the basis upon which this permit was issued. Information may include, but not be limited to, additional engineering, modeling and ambient air quality studies. {Chapter 17, Sections 006, 007, and 008}

(E) Approval to construct, reconstruct and/or modify the source will become invalid if a continuous program of construction is not commenced within 18 months after the date of issuance of the construction permit, if construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable period of time. {Chapter 17, Section 012}

(F) The owner or operator shall allow the NDEQ, EPA or an authorized representative, upon presentation of credentials to: {Neb. Rev. Statute §81-1504}

(1) Enter upon the owner or operator's premises at reasonable times where a source subject to this permit is located, emissions-related activity is conducted or records are kept, for the purpose of ensuring compliance with the permit or applicable requirements;

(2) Have access to and copy, at reasonable times, any records, for the purpose of ensuring compliance with the permit or applicable requirements;

(3) Inspect at reasonable times any facilities, pollution control equipment, including monitoring and air pollution control equipment, practices, or operations, for the purpose of ensuring compliance with the permit or applicable requirements;

(4) Sample or monitor at reasonable times substances or parameters for the purpose of ensuring compliance with the permit or applicable requirements.

(G) When requested by the NDEQ, the owner or operator shall submit completed emission inventory forms for the preceding year to the NDEQ by March 31 of each year. {Chapter 6}

(H) Open fires are prohibited except as allowed by Chapter 30.

(I) Particulate Matter – General Requirements: {Chapter 32}

(1) The owner or operator shall not cause or permit the handling, transporting or storage of any material in a manner, which allows particulate matter to become airborne in such quantities and concentrations that it remains visible in the ambient air beyond the property line.

(2) The owner or operator shall not cause or permit the construction, use, repair or demolition of a building, its appurtenances, a road, a driveway, or an open area without applying all reasonable measures to prevent particulate matter from becoming airborne and remaining visible beyond the property line. Such measures include, but are not limited to, paving or frequent cleaning of roads, driveways and parking lots; application of dust-free surfaces; application of water; and planting and maintenance of vegetative ground cover.

(J) If and when the Director declares an air pollution episode as defined in Chapter 38, Section 003.01B, 003.01C, or 003.01D, the owner or operator shall immediately take all required actions listed in Title 129, Appendix I until the Director declares the air pollution episode terminated.

(K) This permit may be revised (reopened and reissued) or revoked for cause in accordance with Title 129 and Title 115, Rules of Practice and Procedure. Conditions under which this permit will be revised or revoked for cause, include but are not limited to: {Chapter 15, Section 006}

(1) A determination by the Director, or the Administrator of EPA that:

(a) the permit must be revised to ensure compliance with the applicable requirements;

(b) the permit contains a material mistake or that inaccurate statements were made in the emissions standards or other terms or conditions of the permit.

(2) The existence at the source of unresolved noncompliance with applicable requirements or a term or condition of the permit, and refusal of the owner or operator to agree to an enforceable schedule of compliance to resolve the noncompliance;

(3) The submittal by the owner or operator of false, incomplete, or misleading information to the NDEQ or EPA;

(4) A determination by the Director that the source or activity endangers human health or the environment and that the danger cannot be removed by a revision of the permit; or

(5) The failure of the owner or operator to pay a penalty owed pursuant to court order, stipulation and agreement, or order issued by the Administrator of the EPA.

II. SPECIFIC CONDITIONS

(A) The owner/operator of the source shall provide the following notifications to the NDEQ:

(1) The date construction, reconstruction or modification commenced as defined in Chapter 1. Notification shall be postmarked no later than 30 days after such date and include a summary description and whether the requirement to commence construction was met through: {Chapter 17, Section 012}

(a) Initiating physical on-site construction activities of a permanent nature that meet the definition of "begin actual construction", or

(b) Entering into binding agreements or contractual obligations. If this option is used, the notice shall also include a brief summary of each binding agreement or contractual obligation entered into, the date of the agreement or contract, and why it cannot be cancelled or modified without substantial loss to the owner or operator.

(2) The date on which the source or modification first becomes operational, postmarked within 15 days after such date. {Chapter 7, Section 002.03}

(B) Recordkeeping: Records of all measurements, results, inspections, and observations as required to ensure compliance with all applicable requirements shall be maintained on-site as follows:

(1) All calculations and records required throughout this permit shall be completed no later than the fifteenth (15th) day of each calendar month and shall include all information through the previous calendar month, unless otherwise specified in this permit.

(2) All records required throughout this permit shall be kept for a minimum of five (5) years and shall be clear and readily accessible to NDEQ representatives, unless otherwise specified in this permit.

(3) Copies of all notifications, reports, test results, and plans.

(4) Calibration records for all operating parameter monitoring equipment.

(5) Operation and Maintenance manuals, or equivalent documentation, detailing proper operation and maintenance of all permitted emission units, required control equipment, and required monitoring equipment shall be kept for the life of the equipment.

(6) Records documenting equipment failures, malfunctions, or other variations, including date and time of occurrence, remedial action taken, and when corrections were made to each piece of permitted equipment, required control equipment, and required monitoring equipment.

(C) All permitted emission units, control equipment, and monitoring equipment shall be properly installed, operated, and maintained. {Chapter 34, Section 006 and Chapter 35 Sections 006.02 and 006.05}

(D) When performance testing is required it shall be completed and submitted to the NDEQ as follows: {Chapter 34}

(1) Performance tests shall be conducted while operating at maximum capacity (operating conditions producing the highest emissions or loading to the control device) within sixty (60) days after first reaching the maximum capacity, but not more than 180 days after the start-up of operations of each unit, unless otherwise specified by the NDEQ.

(2) Testing shall be conducted according to the methodologies found in Title 129, Chapter 34, Section 002, or other NDEQ approved methodologies.

(3) Performance tests shall be conducted for a minimum of three (3) one hour runs unless another run time is specified by the applicable Standard or as deemed appropriate by the NDEQ.

(4) The owner or operator of a source shall provide the NDEQ at least thirty (30) days written notice prior to testing to afford the NDEQ an opportunity to have an observer present. The owner or operator shall also provide the NDEQ with an emissions testing protocol at least thirty (30) days prior to testing. The NDEQ may, in writing, approve a notice of less than 30 days. If the testing is pursuant to an underlying requirement contained in a federal rule, the notice provisions of the underlying requirement apply.

(5) The owner or operator shall monitor and record the operating parameters for process and control equipment during the performance testing required in the permit.

(6) A written copy of the test results signed by the person conducting the test shall be provided to the NDEQ within sixty (60) days of completion of the test unless a different period is specified in the underlying requirements of an applicable Federal Rule and will, at a minimum, contain the following items:

(a) A description of the source's operating parameters (e.g. production rates, firing rates of combustion equipment, fuel usage, etc.), control equipment parameters (e.g. baghouse fan speeds, scrubber liquid flow rates, etc.), and ambient conditions (e.g. weather conditions, etc.) during testing.

(b) Copies of all data sheets from the test run(s).

(c) A description and explanation of any erroneous data or unusual circumstance(s) and the cause for such situation.

(d) A final conclusion section describing the outcome of the testing.

(E) Any emissions due to malfunctions, unplanned shutdowns, and ensuing start-ups that are, or may be, in excess of applicable emission limits shall be reported to the NDEQ in accordance with Chapter 35, Section 005.

(F) The following conditions apply to the verification of NAAQS modeling analysis: {Chapter 4}

(1) The stack dimensions of the following emission points shall be constructed as indicated below:

Emission Point ID#	Emission Point Name	Minimum Stack Height (ft)	Stack Exit Point Maximum Inside Diameter (m)
EP06	Digester Biogas Flare	17.10	1.417
EP07	Biogas Cleanup Skid System	17.10	0.152

A site survey, or similar documentation containing the as-built stack dimensions, shall be maintained on-site and kept for the life of the source. If stack dimensions do not comply with the table above, the owner or operator shall notify the NDEQ prior to start-up of any emission unit and, if requested, submit a revised air dispersion modeling analysis to the NDEQ to ensure that the source will not interfere with the attainment or maintenance of the ambient air quality standards in Chapter 4.

(2) The owner or operator shall sufficiently restrict public access to the source at the ambient air boundary relied upon in the air dispersion modeling analysis for the NAAQS compliance demonstration. The vertices of the boundary shall be located at the coordinates indicated below:

Fence-line Vertex ID#	UTM X (m)	UTM Y (m)
NW	711,881.74	4,701,538
NE	712,250.88	4,701,550
SNE_1	712,231.39	4,701,454
SNE_2	712,207.19	4,701,390
SNE_3	712,169.86	4,701,335
SNE_4	712,101.51	4,701,269
SNE_5	712,017.97	4,701,208
SW	711,898.35	4,701,139

A site survey, or similar documentation containing the locations of the boundary vertices, shall be maintained on-site and kept for the life of the source. If the boundary dimensions do not comply with the table above (plus or minus 5 meters), the owner or operator shall notify the NDEQ prior to start-up of any emission unit and, if requested, submit a revised air dispersion modeling analysis to the NDEQ to ensure that the source will not interfere with the attainment or maintenance of the ambient air quality standards in Chapter 4.

III.(A) Specific Conditions for Anaerobic Digestion

(1) Permitted Emission Points: The source is permitted to construct the emission points and associated emission units identified in the following table at the capacity and using the fuel types listed:

Emission Point ID#	Required Control Equipment ID# and Description	Emission Unit Description	Maximum Capacity (MMBtu/hr)	Permitted Fuel Type
EP06	-	EU06: Digester Biogas Flare	102.0	Untreated Biogas
			0.1 (pilot)	Natural Gas
EP07	-	EU07: Biogas Cleanup Skid System	-	-
EP06 and/or EP07	EU06: Digester Biogas Flare and/or EU07: Biogas Cleanup Skid System	EU12: Anaerobic Digester #1	-	-
		EU13: Anaerobic Digester #2	-	-

(2) Emission Limitations and Testing Requirements:

The emissions limitations of Chapter 20, Sections 002 and 004 apply to EP06. {Chapter 20}

(3) Operational and Monitoring Requirements and Limitations:

(a) Biogas generated from EU12 and EU13 shall be combusted in EU06 and/or treated in EU07 at all times biogas is being produced. {Chapter 17}

(b) EU06 shall only combust untreated biogas and natural gas. {Chapter 17}

(c) EU06, excluding the pilot, shall be limited to 500 operating hours per any period of twelve (12) consecutive calendar months. At no time during the first eleven (11) months after startup shall the total operating hours for EU06, excluding the pilot, exceed 500 hours. {Chapter 17}

(i) The source shall monitor and record the hours of operation of EU06.

(d) When biogas is being routed to EU06, a flame shall be present in the flare. The facility must install an appropriate safety device or flame monitoring system to ensure that biogas cannot be sent to the flare without the presence of a flame. {Chapter 17}

(e) Observations at least once each day during daylight hours of Biogas Cleanup Skid System operation shall be conducted to determine whether there are visible emissions, leaks, noise, or other indications that corrective action is necessary. If corrective action is required, it shall occur immediately. {Chapter 34}

(4) Applicable NSPS, NESHAP, and MACT Requirements:

The NDEQ has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points or emission units listed in Condition III.(A)(1).

(5) Reporting and Recordkeeping Requirements:

(a) Records shall be kept documenting the hours of operation for EU06 for each calendar month and for each period of twelve (12) consecutive calendar months.

(b) Records shall be kept documenting the date, time, observations, and corrective actions taken for each day the Biogas Cleanup Skid System is in operation.

III.(B) Specific Conditions for Emergency Generator Engine

(1) Permitted Emission Points: The source is permitted to construct the emission point and associated emission unit identified in the following table at the capacity and using the fuel type listed:

Emission Point ID#	Emission Unit ID# and Description	Maximum Capacity (HP)	Permitted Fuel Type
EP08	EU08: Emergency Generator Engine	155	Natural Gas

(2) Emission Limitations and Testing Requirements:

(a) The emissions limitations of Chapter 20, Sections 002 and 004 apply to the emission point identified in Condition III.(B)(1). {Chapter 20}

(b) The source shall comply with the applicable emission limitations and testing requirements as specified in 40 CFR Part 60 Subpart JJJJ and 40 CFR Part 63 Subpart ZZZZ for EU08. {Chapters 18 and 28}

(3) Operational and Monitoring Requirements and Limitations

(a) EU08 shall be limited to 500 operating hours per any period of twelve (12) consecutive calendar months. At no time during the first eleven (11) months after startup shall the total operating hours for EU08 exceed 500 hours. {Chapter 17}

(i) EU08 shall be equipped with a non-resettable hour meter to record the operating hours.

(b) The source shall comply with the applicable operational and monitoring requirements and limitations as specified in 40 CFR Part 60 Subparts A and JJJJ and 40 CFR Part 63 Subparts A and ZZZZ for EU08. {Chapters 18 and 28}

(4) Applicable NSPS, NESHAP, and MACT Requirements:

The following standards apply to EU08:

Applicable Standard	Title	Rule Citation
NSPS, Subpart A	General Provisions	Title 129, Chapter 18, Sec. 001.01 40 CFR 60.1
NSPS, Subpart JJJJ	Stationary Spark Ignition Internal Combustion Engines	Title 129, Chapter 18, Sec. 001.82 40 CFR 60.4230
NESHAP, Subpart A	General Provisions	Title 129, Chapter 28, Sec. 001.01 40 CFR 63.1
NESHAP, Subpart ZZZZ	Stationary Reciprocating Internal Combustion Engines	Title 129, Chapter 28, Sec. 001.88 40 CFR 63.6580

(5) Reporting and Recordkeeping Requirements:

(a) The source shall record and maintain records documenting the hours of operation for EU08 for each calendar month and for each period of twelve (12) consecutive calendar months.

(b) The source shall comply with the applicable reporting and recordkeeping requirements as specified in 40 CFR Subparts A and JJJJ and 40 CFR Part 63 Subparts A and ZZZZ for EU08.

III.(C) Specific Conditions for Paved Haul Roads

(1) Permitted Emission Points:

All on-site haul roads with production-related truck traffic shall be paved. The paved haul roads shall comply with the following conditions. {Chapters 17 and 32}

(2) Emission Limitations and Testing Requirements:

Haul roads are subject to the requirements of Title 129, Chapter 32, Section 002. {Chapter 32}

(3) Operational and Monitoring Requirements and Limitations:

(a) The owner or operator shall utilize best management practices (BMP) on haul roads. The effectiveness of the BMP to minimize emissions from haul roads will be demonstrated by compliance with Condition I.(I). {Chapters 17 and 32}

(b) A survey of the plant property and haul roads shall be conducted for each day of operation during daylight hours to determine if visible fugitive emissions are being generated and leaving plant property. Implementation of BMP shall be taken upon observation of visible fugitive emissions leaving plant property. {Chapter 32}

(4) Applicable NSPS, NESHAP, and MACT Standards:

The NDEQ has not identified any NSPS, NESHAP, or MACT requirements that apply to the haul roads.

(5) Reporting and Recordkeeping Requirements:

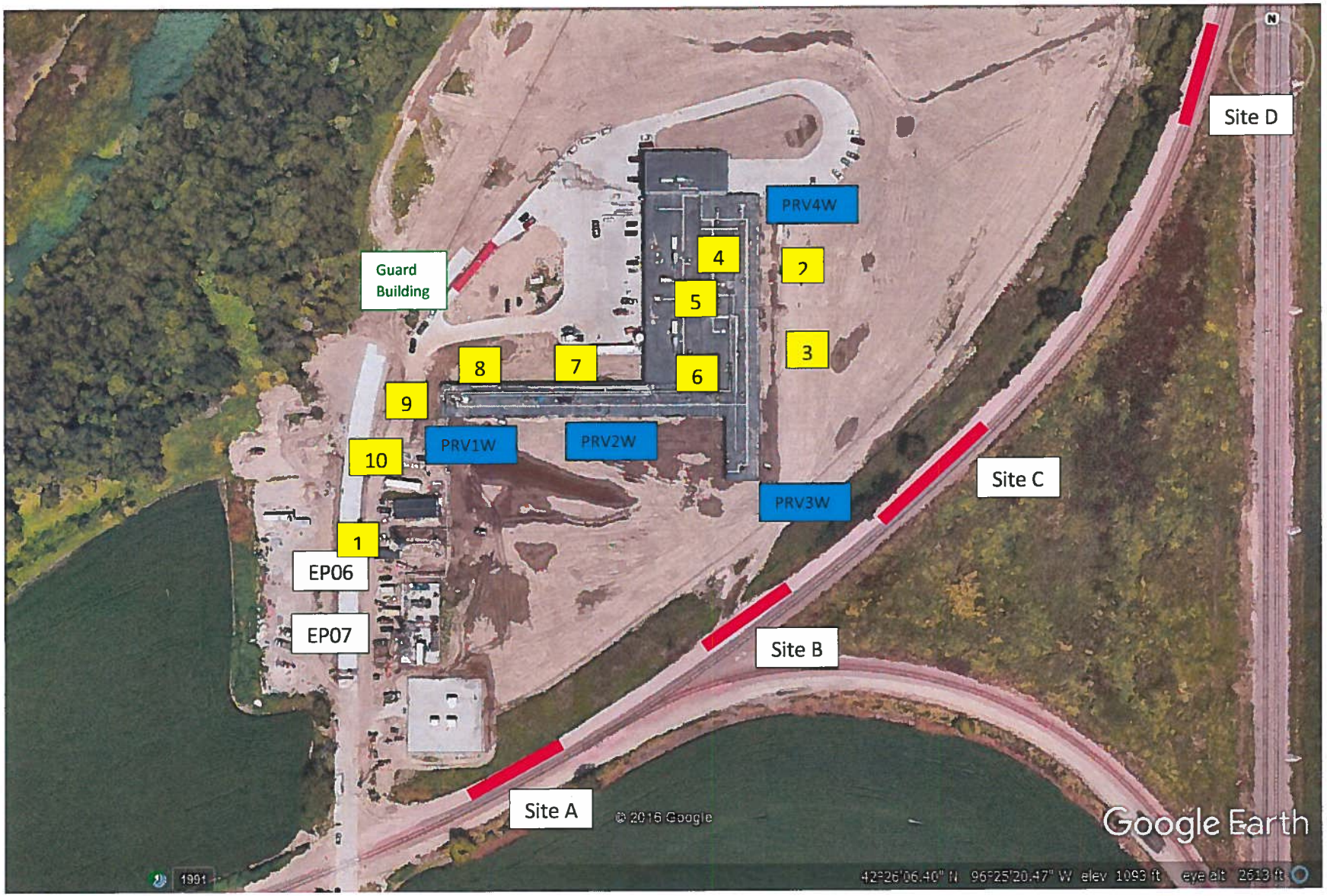
(a) Records shall be kept documenting the use of BMP on haul roads.

(b) Records shall be kept documenting the date and time of fugitive dust surveys, whether visible emissions crossed site boundaries, and any corrective action taken if visible emissions are observed in areas to which the public has access.

This Attachment contains an annotated aerial photograph of facility and facility property, showing locations of specific equipment and areas where photographs or FLIR images were recorded, a Photograph Log, Inspection Photographs and the FLIR Image Log.

Legend:

i. The biogas flare (EP06) and the Biogas Cleanup Skid System (EP07) are found in the lower left portion of the photograph.
ii. Site's A through D (in red) represent general areas offsite where FLIR images and photographs were recorded.
iii. Numbered locations 1 through 10 (in yellow) represent approximate areas onsite where FLIR images were recorded.
iv. Pressure relief valve locations are indicated in blue.
v. The guard office location is in the upper left portion of the photograph in green.


Site D
PRV4W
Guard Building
4
2
5
3
8
7
6
9
PRV1W
PRV2W
10
Site C
PRV3W
1
EP06
EP07
Site B
Site A
© 2016 Google
Google Earth
1991
42°26'06.40" N 96°25'20.47" W elev 1093 ft eye alt 2613 ft

Photograph Log

Facility: Big Ox Energy

Address: 1616 D Avenue

Dakota City, NE 68776

Date: 02/13-15/2017

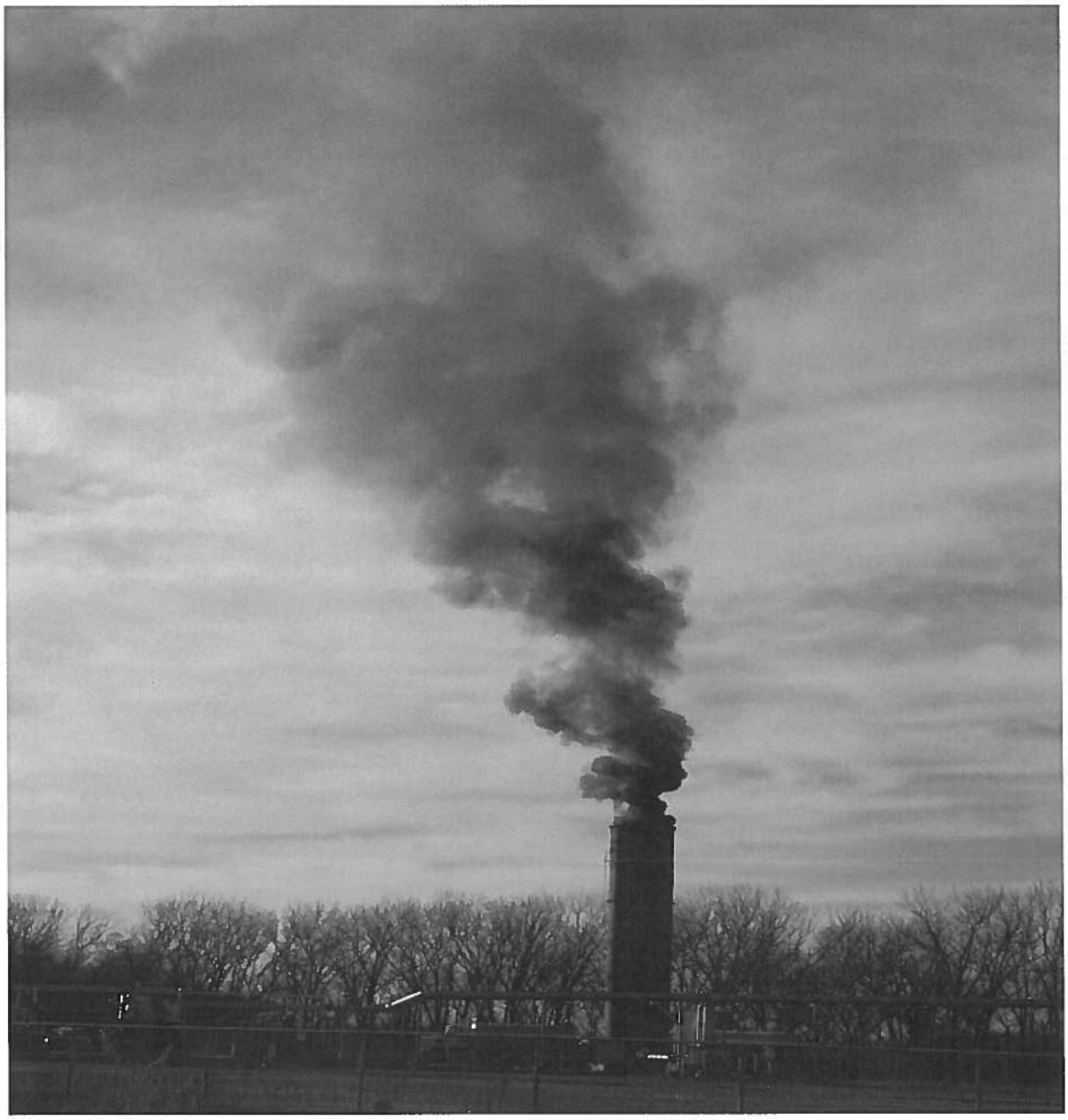
Photographers: Nathan Kush (2/13/2017 photographs) and Sean Bergin (2/14/2017 photographs).

Photograph Image	File Name	Date	Time (hrs.)	Location and Description
1	DSCN01709.jpg	02/13/2017	16.25	Site B. Flare upset facing NW towards flare.
2	DSCN01710.jpg	02/13/2017	16.25	Site B. Flare upset facing NW towards flare.
3	DSCN01711.jpg	02/13/2017	16.25	Site B. Flare upset facing NW towards flare.
4	DSCN01712.jpg	02/13/2017	16.25	Site B. Flare upset facing NW towards flare.
5	DSCN01713.jpg	02/13/2017	16.25	Site B. Flare upset facing NW towards flare.
6	DSCN01714.jpg	02/13/2017	16.25	Site B/C. Flare upset facing NW towards flare.
7	DSCN01715.jpg	02/13/2017	16.26	Site B/C. Flare upset facing NW towards flare.
8	DSCN01716.jpg	02/13/2017	16.26	Site B/C. Flare upset facing NW towards flare.
9	DSCN01717.jpg	02/13/2017	16.26	Site B/C. Flare upset facing NW towards flare.
10	DSCN01718.jpg	02/13/2017	16.26	Site B/C. Flare upset facing NW towards flare.
11	DSCN01719.jpg	02/13/2017	16.26	Site B/C. Flare upset facing NW towards flare.
12	DSCN01720.jpg	02/13/2017	16.27	Site C. Flare upset facing NW towards flare.
13	DSCN01721.jpg	02/13/2017	16.27	Site C. Flare upset facing NW towards flare.
14	DSCN0190.jpg	02/14/2017	10.00	Site A. Facing NNW towards flare (background) and Biogas Cleanup Skid System (BCSS).
15	DSCN0191.jpg	02/14/2017	10.00	Site A. Facing NNW towards flare (background) and Biogas Cleanup Skid System (BCSS).
16	DSCN0192.jpg	02/15/2017	10.04	Site A. Facing NE towards facility.
17	DSCN0193.jpg	02/15/2017	10.38	Site A. Facing North. Flare upset.
18	DSCN0194.jpg	02/15/2017	11.31	Site C. Facing NE towards a pressure relief valve shroud (PRV3W).

Photograph 1

Photographer: Nathan Kush

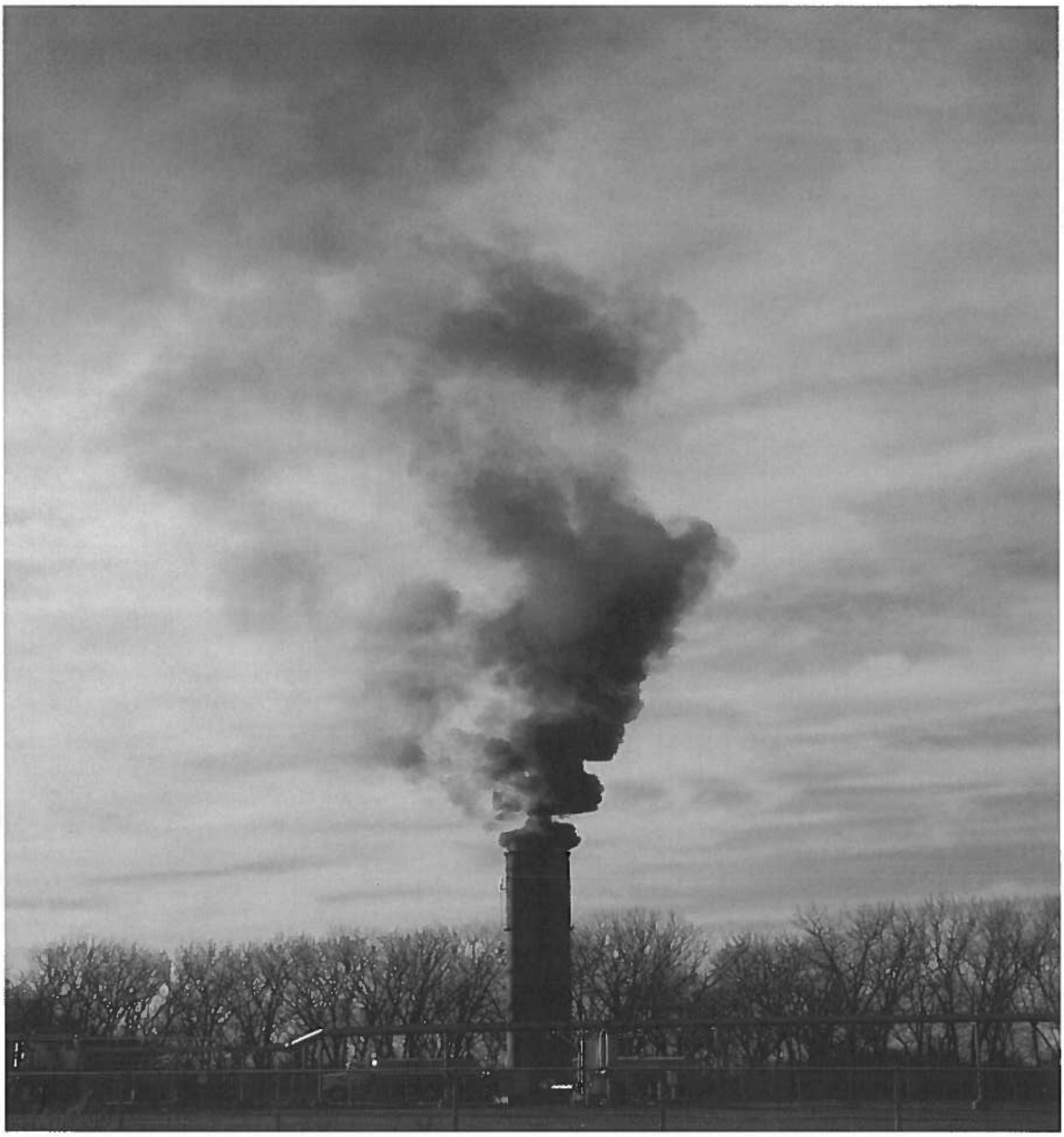
Location and Description: Site B. Flare upset facing NW towards flare.



Photograph 2

Photographer: Nathan Kush

Location and Description: Site B. Flare upset facing NW towards flare.



Photograph 3

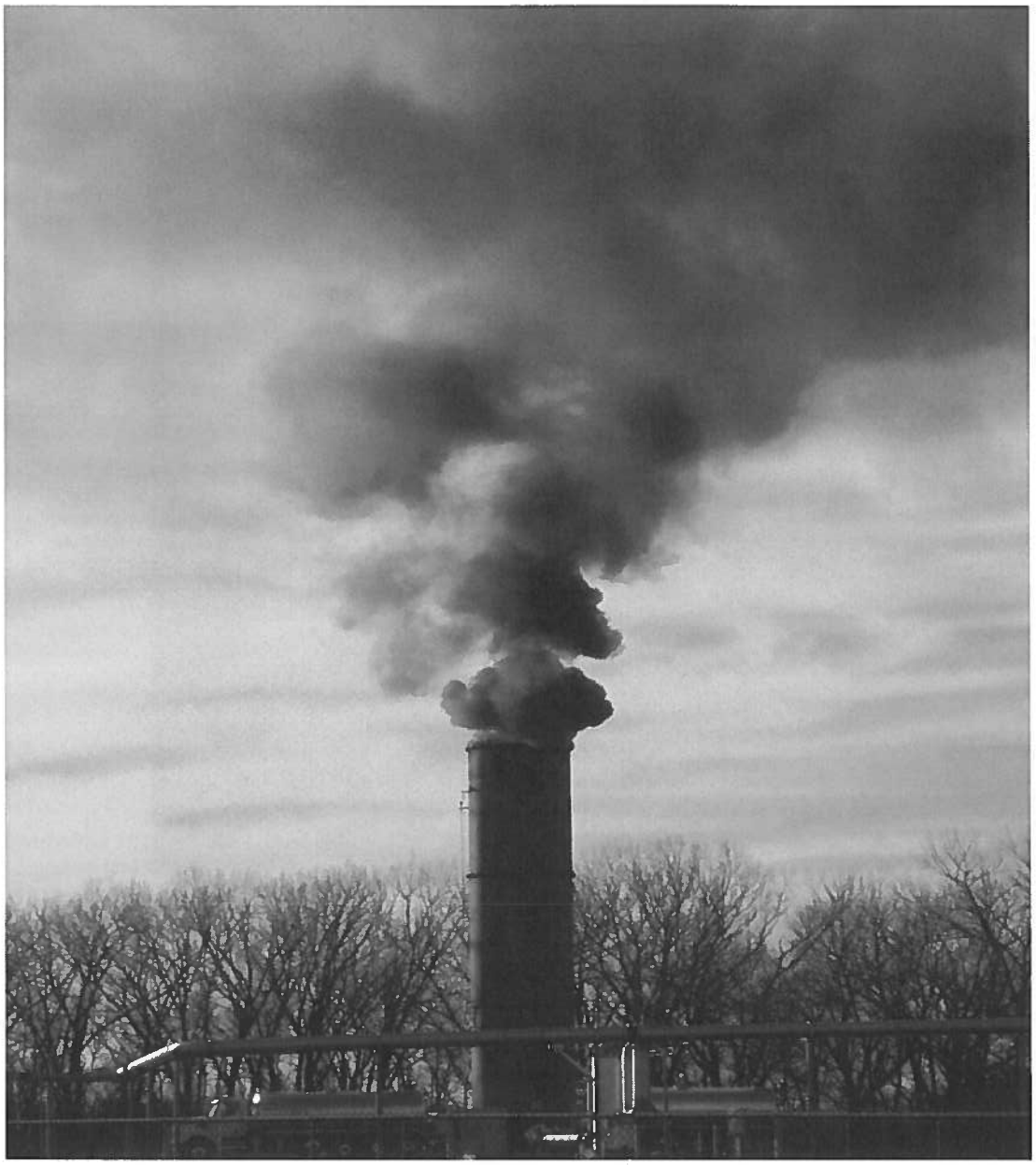
Photographer: Nathan Kush

Location and Description: Site B. Flare upset facing NW towards flare.

Photograph 4

Photographer: Nathan Kush

Location and Description: Site B. Flare upset facing NW towards flare.



Photograph 5

Photographer: Nathan Kush

Location and Description: Site B. Flare upset facing NW towards flare.

Photograph 6

Photographer: Nathan Kush

Location and Description: Site B/C. Flare upset facing NW towards flare.

Photograph 7

Photographer: Nathan Kush

Location and Description: Site B/C. Flare upset facing NW towards flare.

Photograph 8

Photographer: Nathan Kush

Location and Description: Site B/C. Flare upset facing NW towards flare.

Photograph 9

Photographer: Nathan Kush

Location and Description: Site B/C. Flare upset facing NW towards flare.

Photograph 10

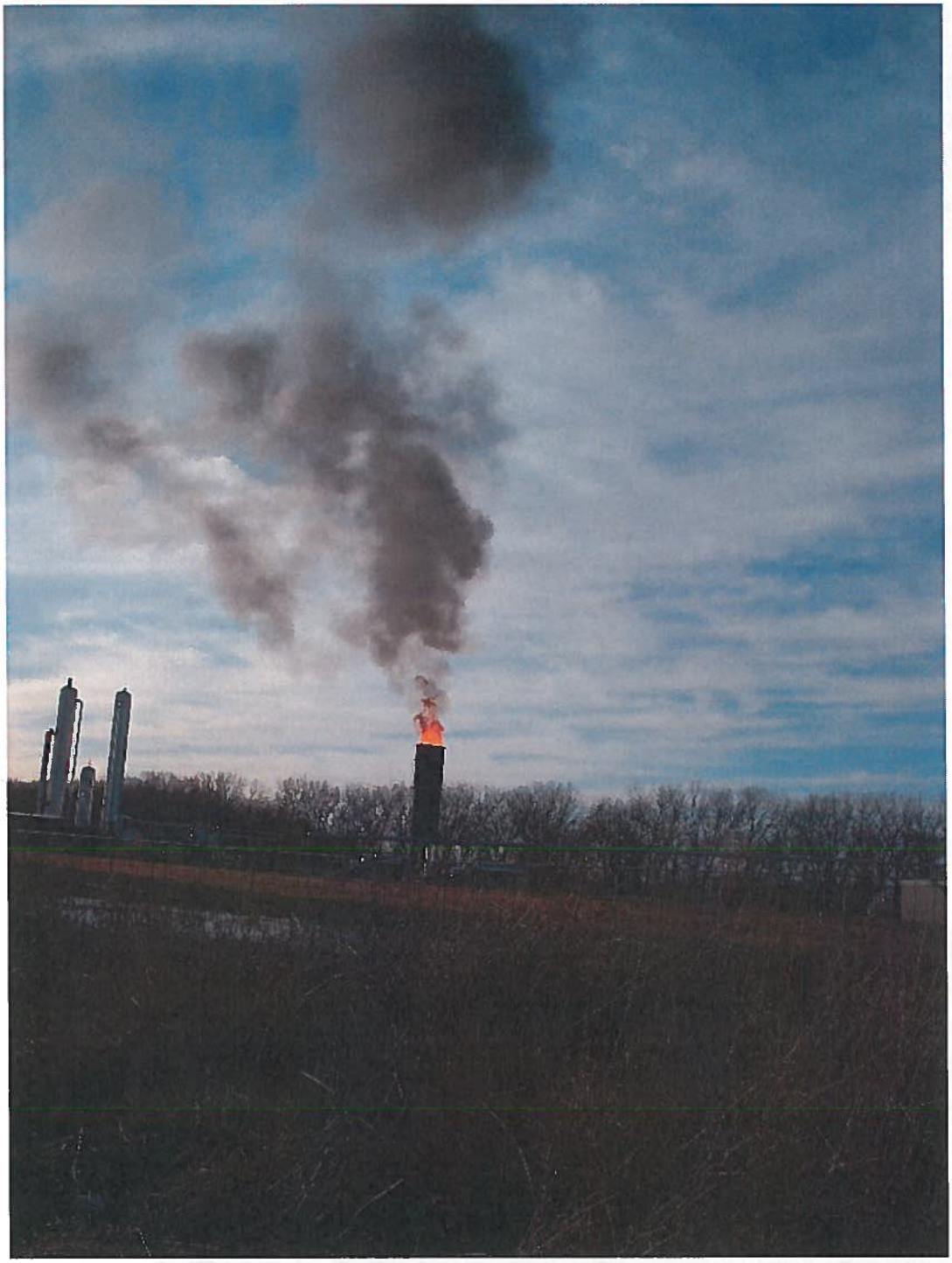
Photographer: Nathan Kush

Location and Description: Site B/C. Flare upset facing NW towards flare.

Photograph 11

Photographer: Nathan Kush

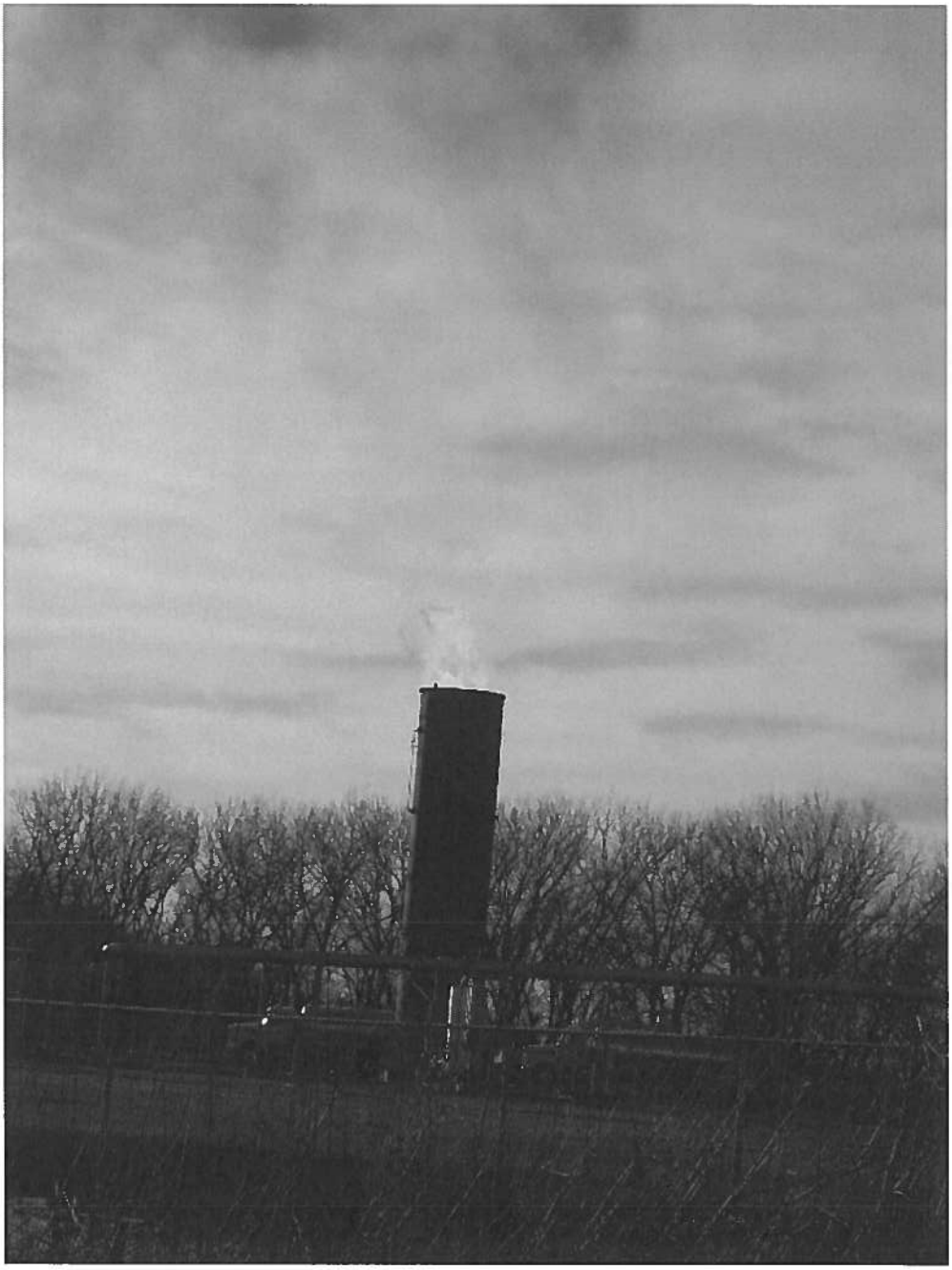
Location and Description: Site B/C. Flare upset facing NW towards flare.



Photograph 12

Photographer: Nathan Kush

Location and Description: Site C. Flare upset facing NW towards flare.



Photograph 13

Photographer: Nathan Kush

Location and Description: Site C. Flare upset facing NW towards flare.

Photograph 14

Photographer: Sean Bergin

Location and Description: Site A. Facing NNW towards flare (background) and Biogas Cleanup Skid System (BCSS).

Photograph 15

Photographer: Sean Bergin

Location and Description: Site A. Facing NNW towards flare (background) and Biogas Cleanup Skid System (BCSS).

Photograph 16

Photographer: Sean Bergin

Location and Description: Site A. Facing NE towards facility.

Photograph 17

Photographer: Sean Bergin

Location and Description: Site A. Facing North. Flare upset.

Photograph 18

Photographer: Sean Bergin

Location and Description: Site C. Facing NE towards a pressure relief valve shroud (PRV3W).

FLIR LOG

Facility: Big Ox Energy

Address: 1616 D Avenue

Dakota City, NE 68776

Date: 02/13-15/2017

Photographer: Sean Bergin

FLIR Image	File Name	Date	Time	Location and Description
1	MOV_1366.mp4	02/13/2017	16.00	Site A. Facing NNW towards flare.
2	MOV_1367.mp4	02/13/2017	16.03	Site A. Facing N towards PRV1W.
3	MOV_1368.mp4	02/13/2017	16.05	Site A. Facing N towards PRV2W.
5	MOV_1370.mp4	02/13/2017	16.26	Site B. Facing NW during flare upset.
6	MOV_1371.mp4	02/13/2017	16.30	Site C. Facing NW following the upset.
7	MOV_1373.mp4	02/14/2017	10.09	Site A. Facing N, flare and PRV1W.
8	MOV_1374.mp4	02/14/2017	10.29	Site A. Facing N, flare upset with telephoto lens.
9	MOV_1375.mp4	02/14/2017	10.32	Site A. Facing NE towards PRV2W with telephoto lens.
10	MOV_1376.mp4	02/14/2017	10.35	Site A. Facing NE towards PRV3W with telephoto lens.
11	MOV_1377.mp4	02/14/2017	10.37	Site A. Facing n towards PRV1W with telephoto lens.
12	MOV_1378.mp4	02/14/2017	10.40	Site A. Facing N towards flare with telephoto lens.
13	MOV_1379.mp4	02/14/2017	10.50	Site A. Facing N towards flare (without telephoto lens).
14	MOV_1380.mp4	02/14/2017	11.15	Site D. Facing west towards PRV4W and flare.
15	MOV_1381.mp4	02/14/2017	11.17	Site D. Facing ESE towards PRV3W.
16	MOV_1382.mp4	02/15/2017	09.30	Duct to flare, facing NE from area 1.
17	MOV_1383.mp4	02/15/2017	09.43	Flare, facing E from area 1.
18	MOV_1384.mp4	02/15/2017	10.08	Area 2, facing E towards PRV4W.
19	MOV_1385.mp4	02/15/2017	10.10	Area 3, facing E towards duct from PRV4W to PRV3W.
20	MOV_1386.mp4	02/15/2017	10.19	Area 4, facing E towards PRV4W from door to roof.
21	MOV_1388.mp4	02/15/2017	10.19	Unusable
22	MOV_1389.mp4	02/15/2017	10.36	Area 4, facing E towards duct from PRV4W to PRV3W.
23	MOV_1390.mp4	02/15/2017	10.37	Area 4, facing E, HMS of duct from PRV4W to PRV3W.
24	MOV_1391.mp4	02/15/2017	10.38	Area 5, facing WSW towards flare.
25	MOV_1392.mp4	02/15/2017	10.39	Area 6, facing S towards PRV3W.
26	MOV_1393.mp4	02/15/2017	10.46	Area 7, facing S towards duct on roof.
27	MOV_1394.mp4	02/15/2017	10.48	Area 8, facing S towards duct on roof.
28	MOV_1395.mp4	02/15/2017	10.50	Area 8, facing S towards duct on roof.
29	MOV_1396.mp4	02/15/2017	10.53	Area 9, facing E towards duct on roof.
30	MOV_1397.mp4	02/15/2017	10.54	Area 9, facing E towards duct on roof.
31	MOV_1398.mp4	02/15/2017	10.55	Area 9, facing SE towards duct from PRV1W to flare.
32	MOV_1399.mp4	02/15/2017	10.59	Area 1, facing E towards junction of duct with flare and BCSS.

Appendix A- Jerome 631-X H_2S Analyzer - Field Data Report

Date: 2/13/17 **Sampler's Name:** Kyle Morton/Nathan Kush

Investigation Area: Sioux City/Dakota City/South Sioux City area – specific sampling sites noted

Jerome Analyzer SN: 1652 **Date of Calibration Check:** 12/29/2016

Wind Direction and Approximate Velocity: ~10mph out of the west

Recon Summary: Overall, highest H2S concentrations and odor were observed directly downwind from EP07 (Biogas Cleanup Skid System). Sampling conducted along approx. 500ft length of gravel service road running parallel to railroad tracks immediately south of facility. Samples were also taken in affected neighborhood areas which were sampled January 10, 2017 and November 2016. No odor was observed in the residential areas sampled.

Date & Time of Analyzer Regenerations: 2/13/17 @ 8:30AM

Date & Time & Results from Field response Checks: None performed

Survey Results

Site Location & Start Time	Individual H_2S Readings (ppm) (minimum 2 required)								Maximum	Minimum
Railroad service road south of Big Ox Energy D Ave/service road intersection 3:42 to 3:46PM	0.004	0.003	0.004						0.004	0.003
Railroad service road south of Big Ox Energy Adjacent to railroad track merge 3:53 to 3:55PM	0.004	0.004	0.004						0.004	0.004
Railroad service road south of Big Ox Energy Approx. 400ft northeast along service road/downwind from EP07 with some odor 3:56 to 3:58PM	0.005	0.005	0.006						0.006	0.005
Railroad service road south of Big Ox Energy Approx. 450ft northeast along service road/downwind from EP07 with evident odor 3:59 to 4:10PM	0.005	0.007	0.006	0.013	0.010	0.006			0.013	0.005
Railroad service road south of Big Ox Energy Approx. 600ft northeast along service road/downwind from EP07; highlight indicates when flare began smoking 4:20PM to 4:40PM	0.005	0.004	0.011	0.009	0.009	0.047	0.015	0.008	0.065	0.004
	0.011	0.027	0.065	0.032	0.017	0.023	0.046	0.035		

South Sioux City area

Site Location & Start Time	Individual H2S Readings (minimum 2 required)								Maximum	Minimum
39th St and G St 12:39-12:41PM	0.003	0.003	0.003						0.003	0.003
Redbird Lane 12:42-12:45PM	0.003	0.003	0.003						0.003	0.003
Redbird Lane cul-de-sac 12:46-12:48PM	0.004	0.004	0.004						0.004	0.004